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METHODS OF TEST FOR CORRUGATED FIBREBOARD

PART I THICKNESS OF BOARD

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METHODS OF TEST FOR CORRUGATED FIBREBOARD

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Indian Standard

METHODS OF TEST FOR CORRUGATED FIBREBOARD

PART I THICKNESS OF BOARD

0. FOREWORD

0.1 This Indian Standard (Part I) was adopted by the Indian Standards Institution on 18 September 1973, after the draft finalized by the Paper and Flexible Packaging Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 The increasing use of corrugated fibreboard for transport containers has given an impetus to this industry for expansion. The growing demand for this product has brought to the fore the need of evaluating the various physical characteristics of the corrugated fibreboard. The standards on test methods for these characteristics are being established for proper evaluation and reproducibility of the test results under different conditions.

0.3 Thickness of the corrugated fibreboard is measured for the use of the designer of the fibreboard case and can vary a great deal when nonuniform pressures for different measurements are applied on the micrometer. The test method for determining the thickness of the test pieces of corrugated fibreboard, when measured under specified pressure, gives repeatable and consistent results.

0.4 The accuracy of measurement invariably depends on the calibration of the measuring instrument and it is desirable to check the same from time to time at regular intervals. A method for the calibration of the dial gauge micrometer has, therefore, been included in Appendix A of this standard.

0.5 In reporting the result of the test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard (Part I) specifies the apparatus and the test procedure for measuring thickness of corrugated fibreboard intended for use in the manufacture of packing cases or used inside such packing cases.

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*Rules for rounding off numerical values (*revised*).

1.1.1 The method is applicable to all types of corrugated fibreboard.

2. TERMINOLOGY

2.0 For the purpose of this standard, the definition given below shall apply.

2.1 Thickness — The thickness of a single sheet of corrugated fibreboard is the distance between two plane parallel surfaces of micrometer by way of which the test pieces are subjected to the specified pressure.

3. PRINCIPLE

3.1 The thickness of fibreboard is measured with the test pieces under a specified pressure.

4. APPARATUS

4.1 Dial Gauge Micrometer — A dial gauge micrometer with a plane circular anvil and a concentric plane plunger. The area of the anvil and of the face of the plunger shall be $10{\cdot}0 \pm 0{\cdot}2$ cm^2.

NOTE — To cover the range of corrugated fibreboard normally encountered, it is desirable that the measuring capacity of dial gauge micrometer should be at least 20 mm.

4.1.1 The measuring surfaces shall be parallel within 1 part in 1 000 of their diameter and the loading of the plunger shall be $20{\cdot}0 \pm 0{\cdot}5$ kN/m^2.

4.1.2 The instrument shall be sufficiently accurate to permit measurement to be made to the nearest 0·05 mm (*see* Appendix A).

5. SAMPLING AND PREPARATION OF TEST SPECIMEN

5.1 Sampling — Representative samples for thickness shall be drawn as prescribed in **3** of IS : 1060 (Part I)-1966*.

5.2 Preparation of Test Specimen — Select samples large enough to permit the cutting of test pieces with an area of 500 cm^2 (200 mm × 250 mm). Test specimen shall be free from damage or other irregularities and shall also, unless otherwise agreed between the parties, be free from converting machine marks.

6. CONDITIONING

6.1 Test specimen shall be conditioned as prescribed in **5** of IS : 1060 (Part I)-1966*.

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*Methods of sampling and test for paper and allied products, Part I (*revised*).

7. PROCEDURE

7.1 The test shall be conducted under the same atmospheric conditions as used for conditioning in **6**.

7.2 Make two measurements on each test specimen as prepared in **5**.

7.3 Place the test piece horizontally between the two faces of the instrument in such a manner that the edges of the test piece are at least 50 mm from the centre of the anvil. Lower the pressure foot gently, slowly and very carefully on to the test specimen, so that all punching effect is avoided. Ensure that the test piece remains parallel with the measuring surfaces of the micrometer despite the effect of liverage caused by the mass of the test piece. Also do not impose any stress on the instrument or the test piece by the hand when a reading is being taken. Take the reading when the pointer has ceased to move.

8. TEST REPORT

8.1 The test report shall include the following particulars:

a) Date and place of testing;
b) Description and identification of material tested;
c) Conditioning atmosphere used;
d) Number of individual measurements;
e) Standard deviation of the thickness;
f) Arithmetic mean of all measurements in mm;
g) Details of any deviation from this test method; and
h) Any other information which may assist in the correct interpretation of the test result in particular, whether any areas compressed by printing or other converting machines are involved.

APPENDIX A

(*Clauses* 0.4 *and* 4.1.2)

CALIBRATION OF THE DIAL GAUGE MICROMETER

A-0. GENERAL

A-0.1 For instrument in frequent use, it is desirable that the calibration should be checked daily for repeatability and accuracy, and monthly for parallelism and foot pressure. If the instrument is not within the tolerance for any test, it should be corrected before subsequent tests are made.

A-0.2 Checking should be carried out in the following order.

A-1. PLANARITY OF FOOT AND ANVIL

A-1.1 The pressure foot and the anvil should be carefully wiped and opened slightly so that the gap can be seen against a bright light. The gap should be quite even, when observed in two directions at right angles.

A-2. PRESSURE EXERTED BY THE FOOT

A-2.1 Any suitable means of checking the accuracy and uniformity may be used.

A-3. REPEATABILITY OF MEASUREMENT AND DETERMINATION OF INDICATION ERROR

A-3.1 Set the instrument correctly at zero before commencing.

A-3.2 Use a set of slip gauges (gauge blocks) of different thickness that have previously been checked.

A-3.3 Insert these individually or in combination between the anvil and the pressure foot and note the corresponding reading on the scale.

A-3.4 Check the instrument at approximately 10, 30, 50, 70 and 90 percent of the full scale readings.

A-3.5 Take a series of at least five readings at the zero position, followed by at least five readings at each check point and finally a further set of at least five readings at the zero position.

A-3.6 The instrument should not be reset to zero during the procedure.

A-3.7 For each check point on the scale, repeatability of measurement is the standard deviation of the five or more readings taken; indication error is the difference between the mean of the five or more readings and the slip gauge thickness.

A-4. PARALLELISM OF FOOT AND ANVIL

A-4.1 Insert a precision ground cylinder on the edge at one side of the pressure foot and note the thickness shown on the scale.

A-4.2 Insert the same precision ground cylinder on the edge of the opposite side and note again the thickness shown on the scale.

A-4.3 Repeat the procedure at right angles to the original position.

A-4.4 Repeat the procedure with other cylinders at approximately 10, 30, 50, 70 and 90 percent of the full scale readings.

A-4.5 The error of parallelism is defined as half the square root of the sum of the squares of the difference between the opposite readings at the ends of the two perpendicular diameters, that is:

$$0{\cdot}5\,(d_1{}^2+d_2{}^2)^{\frac{1}{2}}$$

where d_1 and d_2 are each the difference between the measurements at two opposite points.

NOTE—Metric gauge blocks complying with the requirements of Grade 1 of IS:2984-1966* are satisfactory for these tests. The number of precision cylinders required may be reduced by using a cylinder on top of a gauge block during tests for parallelism.

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*Specification for slip gauges.

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